VOLUME XIX / NUMBERS 1 & 2 / FIRST & SECOND QUARTER 1979

MODERN STEEL CONSTRUCTION

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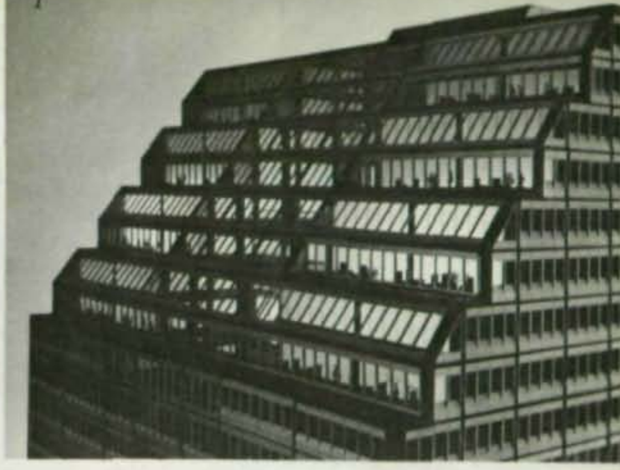

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MODERN STEEL CONSTRUCTION

Published by

American Institute of Steel Construction

The Wrigley Building
400 North Michigan Avenue
Chicago, Illinois 60611

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VOLUME XIX / NUMBERS 1 &2 / FIRST & SECOND QUARTER 1979

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AISC HEADQUARTERS NOW IN CHICAGO

The American Institute of Steel Construction has moved its headquarters offices from New York, N.Y. to the following address, effective July 1, 1979:

Wrigley Building, 400 North Michigan Avenue
Chicago, Illinois 60611
Phone: (312) 670-2400

On the same date, the regional offices of AISC were reorganized into five regional groups as indicated in the listing at the lower left of this page.

1979 T. R. HIGGINS LECTURESHIP AWARD

Dr. John W. Reed has been named recipient of AISC's Ninth Annual T. R. Higgins Lectureship Award. Dr. Reed was chosen to receive the $2,000 award for his contribution to the fund of engineering knowledge based upon his paper entitled "Human Response to Wind-Induced Motion of Buildings", which was judged the most significant engineering paper on fabricated structural steel published within the five year period from 1/1/73 to 1/1/78. The paper was co-authored by Robert J. Hansen and Erik H. Vanmarcke of MIT, and published by the ASCE Journal of the Structural Division, July, 1973.

1979 FELLOWSHIP AWARDS

Four engineering students have been awarded $3,500 fellowships in AISC's 17th Annual Fellowship Awards Program. The program is designed to encourage expertise in the creative use of fabricated structural steel.

Richard F. Bertz	*Clemson University*
Gary A. Householder	*University of Wisconsin – Milwaukee*
Terry D. Kottwitz	*University of Missouri – Columbia*
William J. Rasdorf	*Carnegie-Melon University*

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33 West Monroe Optimizes Building Efficiency

The 33 West Monroe office building in Chicago was designed to optimize its building systems with an emphasis on energy efficiency at a minimum cost. The designers utilized a steel-framed structure on hardpan caissons with a distinctive facade and step-back terracing of the top floors. The interior design features large floors and three atriums stacked vertically.

Innovative Concept

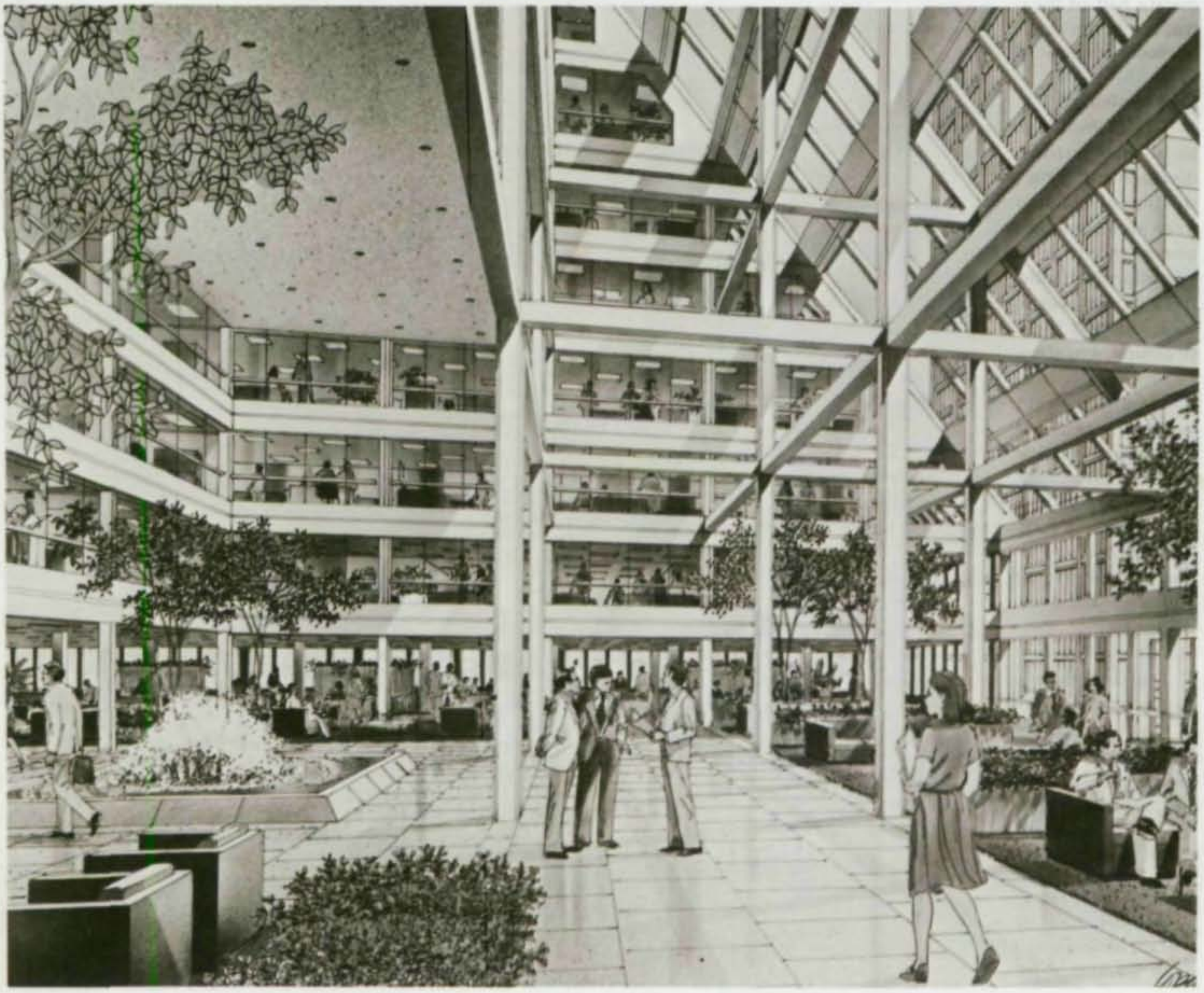
The unusually large typical floors are the result of the building covering the entire development site and the use of structural steel. A distinct profile is created by the sloping setback terracing of the uppermost eight levels. The interior space is highlighted by the internal exposure to the atriums.

The atrium concept emerges as the dominant feature of the building. Both the interior and exterior are designed around the three multi-story atrium spaces, creating three distinct building identities, energy efficiency, and a variety of floor configurations. The floor areas range from 20,000 sq ft to 38,750 sq ft, depending on the cutout of the atrium. The atrium brings natural light into these spaces, creating marketable lease spaces.

Energy Efficiency Realized

The organization of the typical floor plan is such that there is no second class office space. Virtually all leaseable space either overlooks an atrium or has an exterior view.

Flexibility in floor arrangements is emphasized further by the design of the building systems. Electricity supply, telephone service, and temperature control were carefully considered. A network of electrical and telephone ducts in the floor permits tenant installation and modifica-



tions at minimum inconvenience and expense. In addition, the variable volume air-conditioning system is designed to respond to varying load requirements. The installation of a loop system serving a number of individual zones results in independent control and distribution of air.

The building layout and elevator system contribute to an unusually efficient floor plan. Rentable space makes up 90 percent of the building. The elevator system works with the express-to-local concept, using the sky lobbies as transfer points. These lobbies are the base level of the atriums, providing a unique atmosphere for reception areas.

The design of the building enclosure is intended to minimize heat-gain and heat-loss. The reflective glass used is set in insulated aluminum panels. The aluminum panels are designed to achieve an insulating value of 0.10 BTU/sf/F°. The exterior glass surface is equal to about 10 percent of the building's floor space, or approximately half of the comparable percentage realized in the majority of office buildings of recent construction.

Cost Minimized

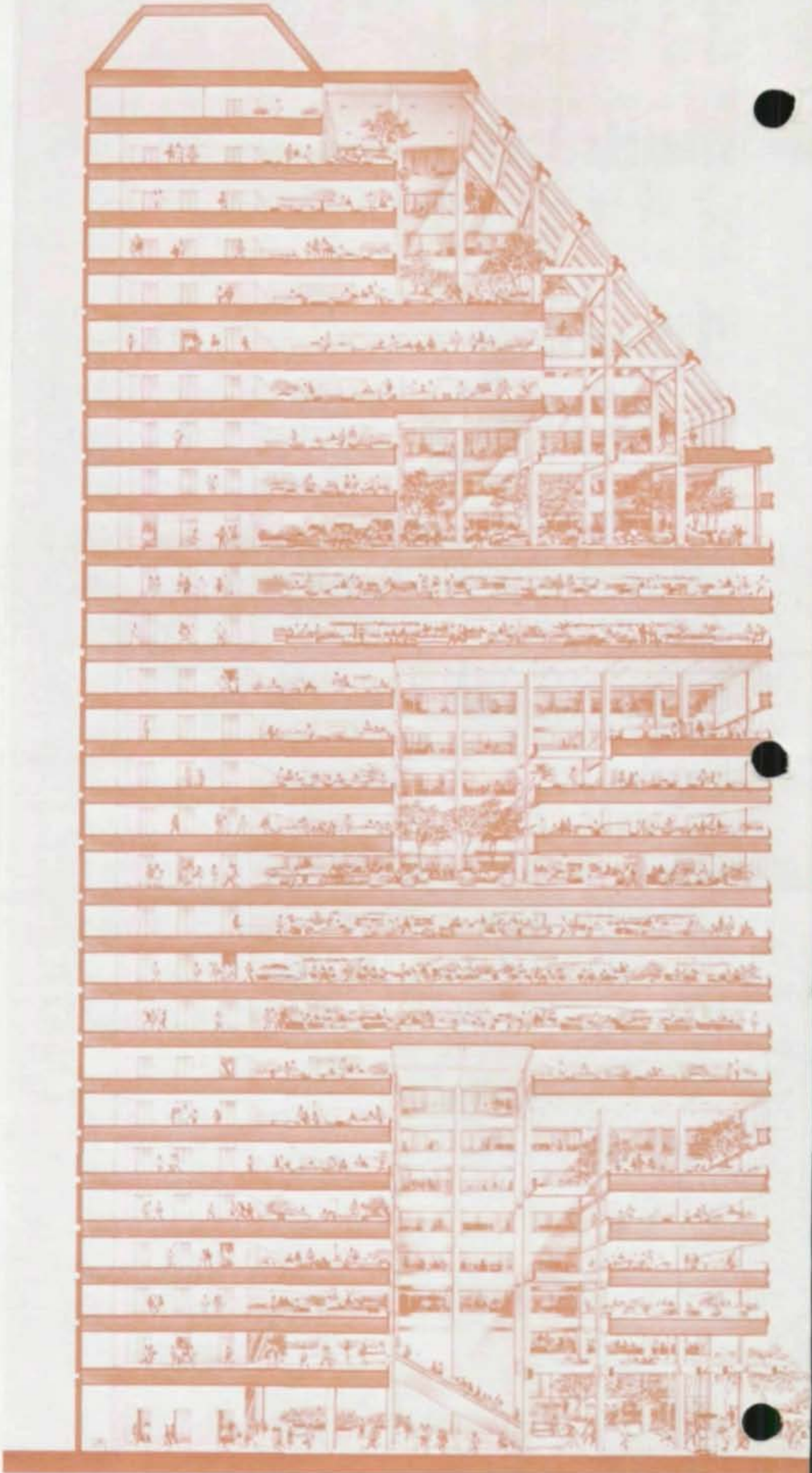
The 33 West Monroe building responds to a new attitude in office building development. This concern involves the creation of building systems, which minimize initial cost and life cycle cost to the owner and tenants without diminishing operational effectiveness or quality. The building achieves an optimization of its enclosure and the mechanical, electrical, structural, and elevator systems.

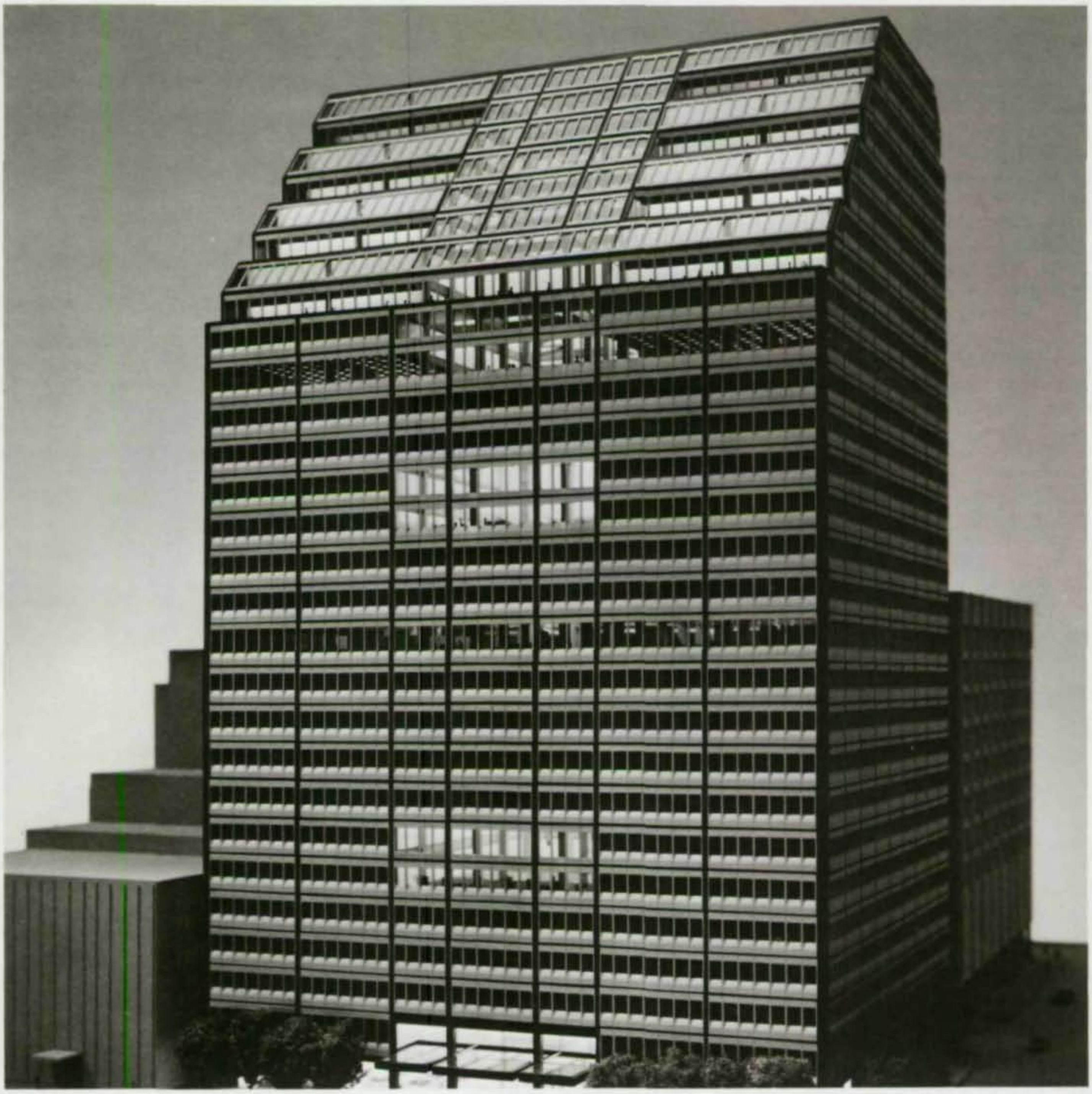
Energy efficiency is further accentuated with the atrium design. Offices overlooking enclosed atriums are removed from direct outside exposure. The glass-to-floor area ratio of 1:10 compares dramatically to the 1:5 ratio of conventional building forms. In all, the external building surface is less than 40 percent glass compared to a conventional building. The mechanical systems design-load requirements of this building are proportionately reduced.

The large floor areas derived from the atrium configuration result in a building of greatly reduced height, allowing for a structural system requiring less steel and a shorter construction period. This design also reduces the direct consumption of energy in materials fabrication, transportation, and project erection.

Simple Steel Frame

The structural system utilizes the large overall dimensions of the floors to maximum advantage in evolving an efficient





and simple steel frame system.

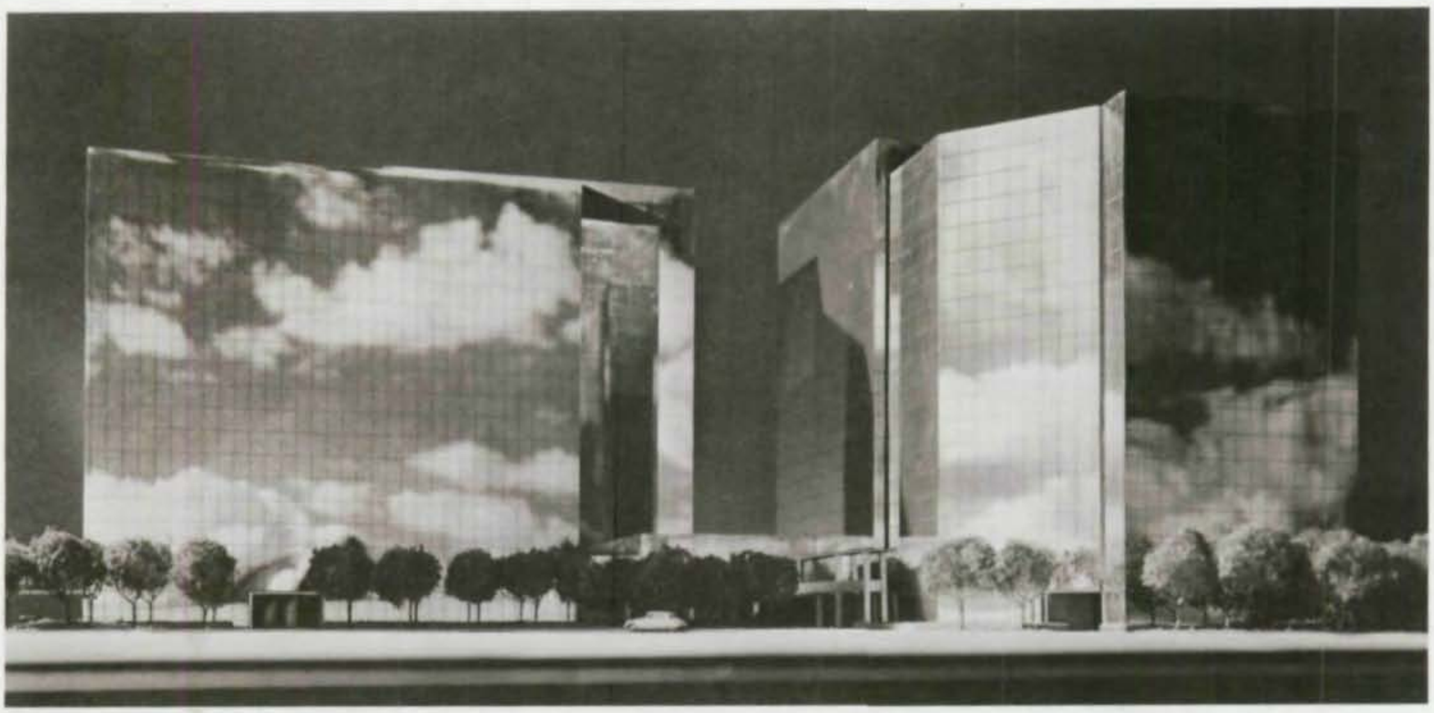
The system utilizes moment connected plane frames on the facades of the building to resist wind forces, while all interior framing is connected with conventional simple shear connections. The building dimensions of 180 ft x 210 ft, with bays of 20 ft x 35 ft, 20 ft x 30 ft, and 20 ft x 20 ft, rendered the plane frames extremely efficient, which otherwise would have involved significant structural steel premiums. The use of non-rigid simple framing on the interior was logical from the point of view of framing flexibility required for changing atrium dimensions. The efficiency of the overall steel system is indicated by the steel weight of 13 psf for this 28-story structure. The floor framing consists of blended cellular composite steel deck on composite beams.

The structural design of 33 West Monroe made an innovative architectural design possible, as it optimizes building systems. This optimization is most emphasized in the simplicity and efficiency of the structural systems.

Architect/Engineer:
Skidmore, Owings & Merrill
Chicago, Illinois

General Contractor:
Schal Associates
Chicago, Illinois

Steel Fabricator:
American Bridge Division
United States Steel
Pittsburgh, Pennsylvania



A WINNING TEAM SWITCH?

by Patrick Allen and James Marsh

The team comprises the Koll Company, contractor, Langdon & Wilson, architects, both of Newport Beach, Calif., and Brandow & Johnston Associates, structural engineers of Los Angeles. The game? Master planning, designing, and building Koll Center Newport, Newport Beach, a $100-million, 117-acre planned commercial community. The switch? Not the team, but the type of construction.

After design and construction of seven concrete-framed buildings within this commercial development, representing 250,000 sq ft of floor space, the team has switched to steel frame construction for the next two buildings, which will add an additional 497,000 sq ft of gross floor area.

Dubbed "The Zebra Building"

The first steel structure to be completed, designated KCN 8, has gained the nickname "The Zebra Building" because of its exterior facade, which consists of reflective black silver glass in wide horizontal bands.

The switch to steel allowed the architect to create a unique shape for the building, while using a conventional rigid frame structural system. The 6-story office building is eight-cornered, which naturally provides more of the highly sought after corner executive spaces.

Each element, member, and connection of the framing was carefully selected to achieve the utmost economy, as well as satisfactory performance. The interior framing is composite construction—concrete slab over metal deck designed for the minimum number of ¾-in. diam. studs required for the actual moments and shears. The horizontal forces, wind or earthquake, are resisted by the exterior perimeter frames. Although A36 steel is specified for most of the steel framing, a switch to A572 steel for the columns eliminated more than 50 percent of the usual stiffener and doubler plates in the connections. All connections were welded to develop the plastic moment capacity of beams or girders and to achieve a 100 percent ductile moment-resisting frame.

According to Koll Company management, after conducting several comparison cost studies, the rigid steel frame proved the most economical framing system available at the time of construction.

The building's two-story main lobby features solid oak ceilings and wall sections, inlaid brick paving, an oak-trimmed luminous ceiling, and a distinctive oak-encased glass staircase serving the second floor. The building incorporates exterior entry plazas, giving ground floor tenants the option of entering directly from the plaza or through the main lobby. The bottom line to this building is the fact that 100 percent of the space was leased months prior to completion.

Two Buildings in One

The Koll Center Newport design team, headed by Ernie Wilson, of the architectural/master planning firm of Langdon & Wilson, continued their originality in the design of the second steel structure. Designated KCN 10/10, this is actually two buildings in one—twin 10-story office towers connected by a 2-story corridor that also contains tenant space.

The building would have consisted of a single 20-story tower, if the airport height allowance was not limited to 150 ft above grade. The twin 10-story towers were the most logical solution to avert this stipulation, while providing sufficient office space.

Scheduled for completion this summer, the building will have 397,000 sq ft of gross space that the team describes as being totally responsive to energy conservation. A complete management system has been developed to include variable volume and temperature control, an economizer cycle, induction boxes, and high efficiency lighting with multi-level switching. In addition, each floor is dampered for

Height limitations led to a twin-tower design for KCN 10/10.

IT HAPPENED!

efficient after-hour and weekend use of individual floors. The towers also have complete life safety and fire systems featuring on-site water storage, two generators, smoke detectors, sprinkler valves throughout, direct linkage with ADT alarm, and emergency power and pressurized exhaust control.

The rectangular 10-story towers, featuring two 45-degree angled corners and a reflective glass exterior, will occupy the most prestigious location in this planned community development for business, offering its tenants a magnificient panorama of mountains, greenbelts, and ocean. Tenants looking across the 40 ft between the towers do not see other offices. Rather, the reflective glass walls mirror the surrounding scenery to create unexpected views of clouds and skyline.

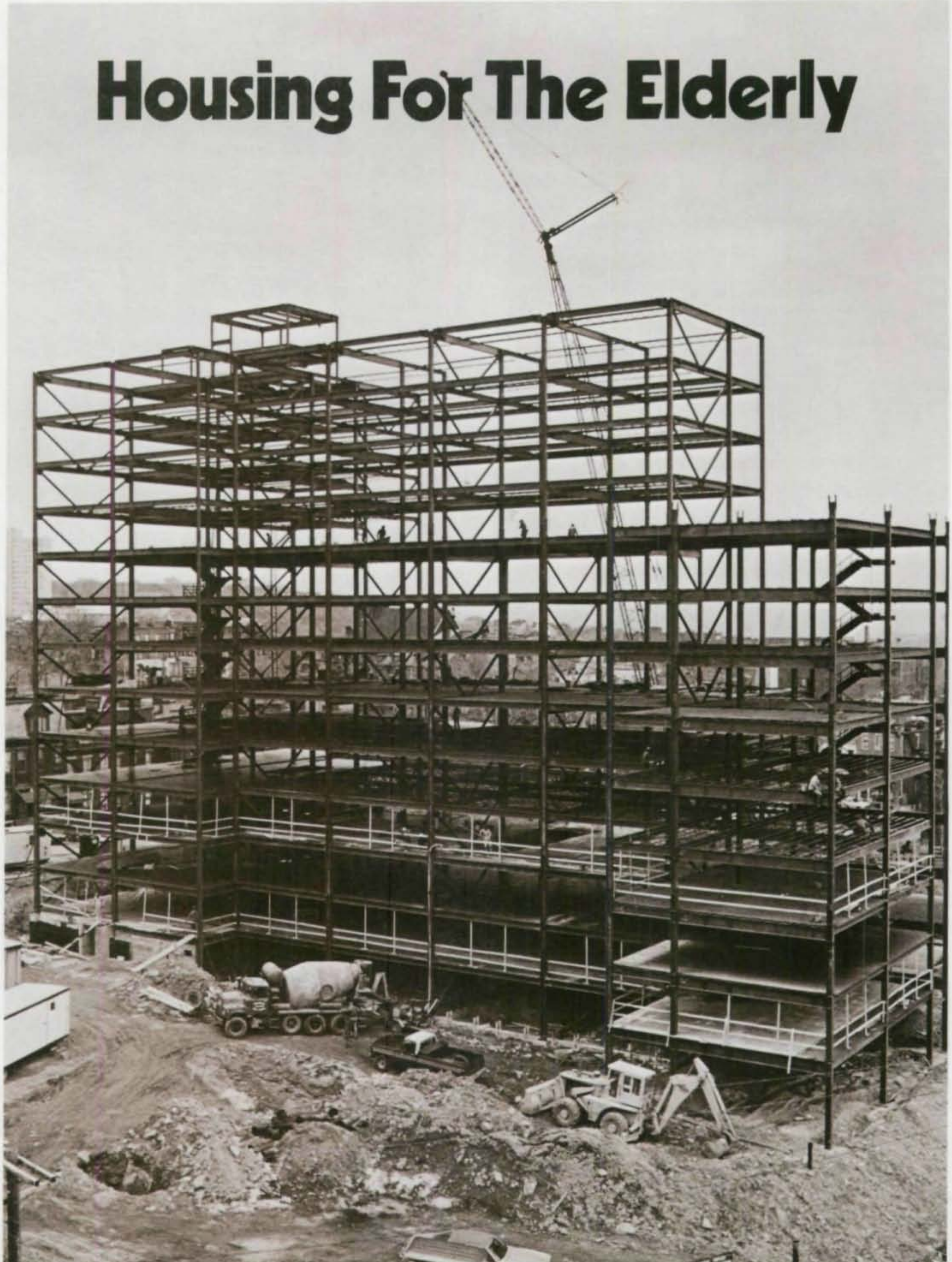
Will the team switch back? Building No. 11 is on the boards and is a 9-story, 135-foot cube-shaped structure adding another 164,000 square feet, and it's steel framed, which lends credence to the old adage "Never change when you're winning", or is it "100% occupancy spells success"?

Patrick Allen is an architect with Langdon & Wilson, Newport Beach, Calif., architects on these projects.

James Marsh is Regional Manager, based in Los Angeles, for AISC's Western Region.

KCN 8 has been dubbed the "Zebra Building", because of its striped facade.

Housing For The Elderly



The recent topping-out ceremony for the K. Leroy Irvis Tower, Pittsburgh, Pa., a 13-story apartment building for the elderly, celebrated not only the completion of steel erection, but also the remarkable fact that 974 tons of steel were erected in just 18 working days.

According to the general contractor, that speed of erection was the main reason for choosing a steel frame. There had been some delays caused by bad winter weather when the foundation was being installed and steel was the best bet for making up lost time.

The high-rise building is being constructed in Pittsburgh's Lower Hill District and is scheduled for completion in January 1980. It is named for state representative and current House minority leader K. Leroy Irvis, who resides in the area and represents a major portion of the city.

When completed, the building, which is located behind Pittsburgh's Civic Arena overlooking the eastern edge of the city, will contain 191 apartments, plus recreational, utility, maintenance, office and tenant service facilities. Ample parking space also is provided.

Shaped Like an I-Beam

Overall, the building has a length of more than 181 ft and is shaped somewhat like a steel I-beam. Its width is 107 ft on one end of the I and 87.4 ft on the opposite end. The web of the I shape is 64 ft wide.

Some 715 tons of structural steel and 259 tons of joists were used in the frame. All columns are ASTM A572 Gr. 50 steel, while beams and girders are ASTM A36.

Preliminary Framing Analysis

During the conceptual stage of the construction project, a preliminary analysis was prepared. Three structural systems were considered: structural steel with joists, structural steel with precast concrete plank, and structural steel with composite deck. After a cost analysis, steel with a joist system was chosen as the most economical solution. The general contractor said that the savings in construction time offered by the steel-framed solution proved to be decisive. This was especially critical as construction of the frame was scheduled for the winter months. Previously, the general contractor had used masonry and precast plank in constructing high-rise apartment buildings.

Steel Details

The building's wind resistance in the long direction is provided by four rigid bents utilizing end plate connections. The end plates are 1¼-in. thick. K-bracing is used in four bents in the short direction of the building. Bracing members are tubular sections.

The floor system consists of 2½-in. of concrete on corrugated steel deck. Open web joists span between girders. The structure rests on 43 caissons, up to 48 in. in diameter, and grade beams. The girders, columns and bracing members have a three-hour fire rating, while the floor ceiling assembly has a two-hour rating.

The exterior of the building is precast wall panels and reinforced stucco around the perimeter and the columns at the balconies are clad with precast.

Because the building is to be occupied by elderly persons, access is at ground level. There are no steps. The building contains two elevators. Of the 191 apartments, 10 percent are designed for handicapped persons, with special features for persons confined to wheelchairs.

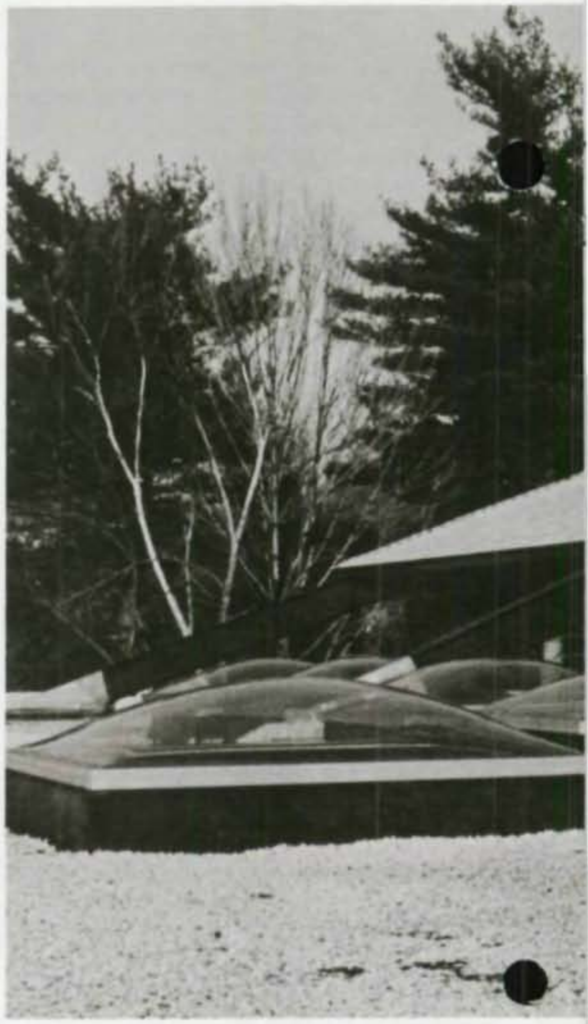
Architect:
Valentour, English and Associates
Pittsburgh, Pennsylvania

Structural Engineer:
Gensert, Peller Associates
Cleveland, Ohio

General Contractor:
McAnallen Corp.
Washington, Pennsylvania

Fast steel erection made up for winter delays, put the project back on schedule.

THE CHAPPAQUA LIBRARY



The Chappaqua Library is a one-story structural steel frame building in suburban New York State, designed for an alert, active community that wanted a structure at once inviting, flexible, expandable, efficient, and economical to operate. In addition to library functions, the building provides facilities for community group activities such as meetings, seminars, lectures, concerts, dramas, and films.

Site restrictions led to the location of the building over the line of an existing county trunk sewer and partially in the flood plain of a brook that traversed the site.

Steel "Maypole" Column

Economical column-free space was achieved by framing 15,000 of the total 23,500 sq-ft library area with a steel truss system radiating from one central 8½-ton steel column. Eight steel members, sloping from the top of the mast column, in "maypole" style, pick up 53 tons of cantilevered horizontal girders in the plane of the roof in a modified king post system.

A fan room, located on the main roof around the mast column, balances the uplift reactions of the cantilever roof girders, and makes for economical short air distribution down-runs.

Site Development and Foundations

Site development called for rerouting the brook to run along the periphery of the site to its normal outfall culvert. Unsuitable organic material was excavated and replaced with controlled compacted fill to raise the building floor well above possible flood level. At the mast, a single cluster of piles was driven, with tips set far below the invert elevation of the sewer, thus imposing no load on it. Other foundation loads are carried on shallow depth footings.

Economy Achieved

The single column design afforded grand terrace and building spaces, proved the most economical frame for the layout, and had favorable economic effects on the mechanical distribution systems and the foundation construction. Using the full height of the mast, the architect elevated the rooflines to visually offset the one-story building against a wooded hillside.

Including energy measures, the building cost was $54.35 per square foot, which is reasonable for library costs in the Westchester, N.Y. area. The total final project cost was $1,700,000, putting it $97,000 below the budgeted construction cost.

Architect:
Philip Chu of Kilham Beder & Chu
New York, New York

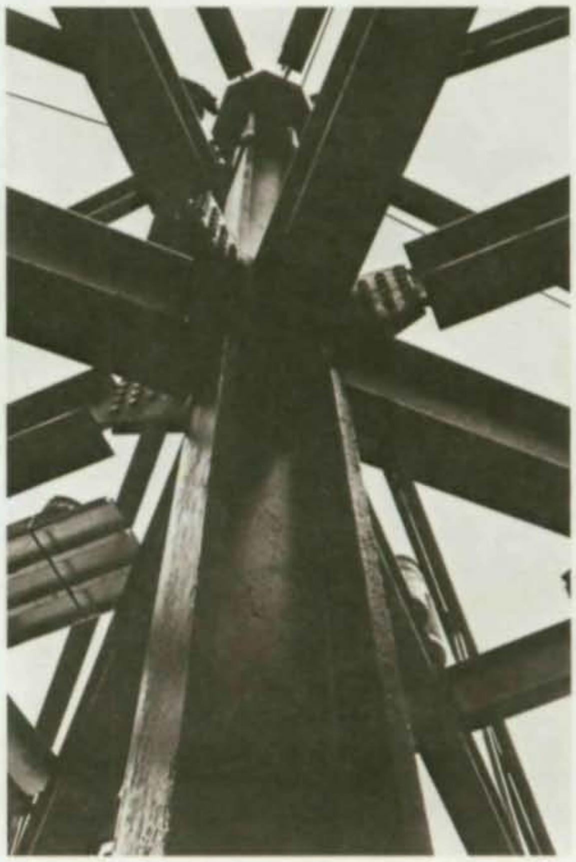
Structural Engineer:
Goldreich, Page & Thropp
New York, New York

General Contractor:
Silverite Construction Company, Inc.
Hicksville, New York

Steel Fabricators:
The George H. Olsen Steel Co.
Stratford, Connecticut

Zaffino & Sons
New Rochelle, New York

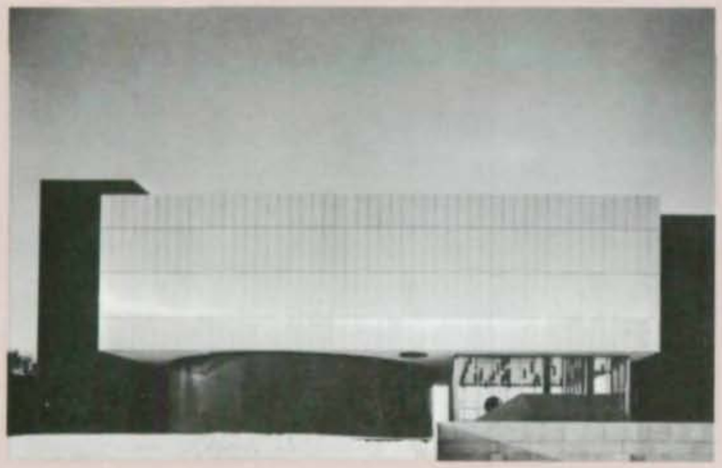
Steel truss system radiates from a central "maypole" column.



1978 Architectural Awards of Excellence

RAINBOW CENTER MALL & WINTER GARDEN
Niagara Falls, New York
Architect: Gruen Associates

DETROIT SCIENCE CENTER — PHASE 1
Detroit, Michigan
Architect: William Kessler and Associates, Inc.



EAST CAMBRIDGE SAVINGS BANK HEADQUARTERS
Cambridge, Massachusetts
Architect: Charles G. Hilgenhurst & Associates

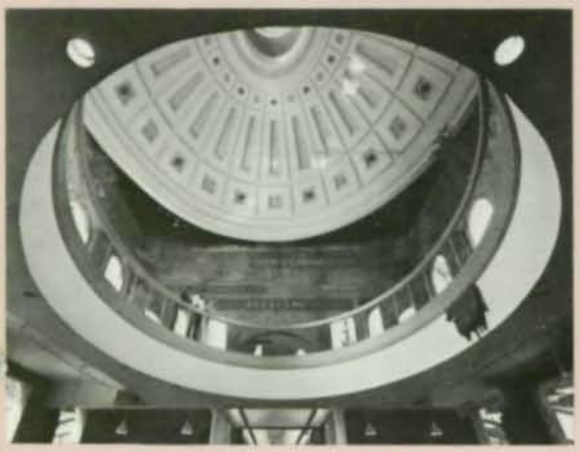
BRONX DEVELOPMENTAL CENTER
Bronx, New York
Architect: Richard Meier & Associates

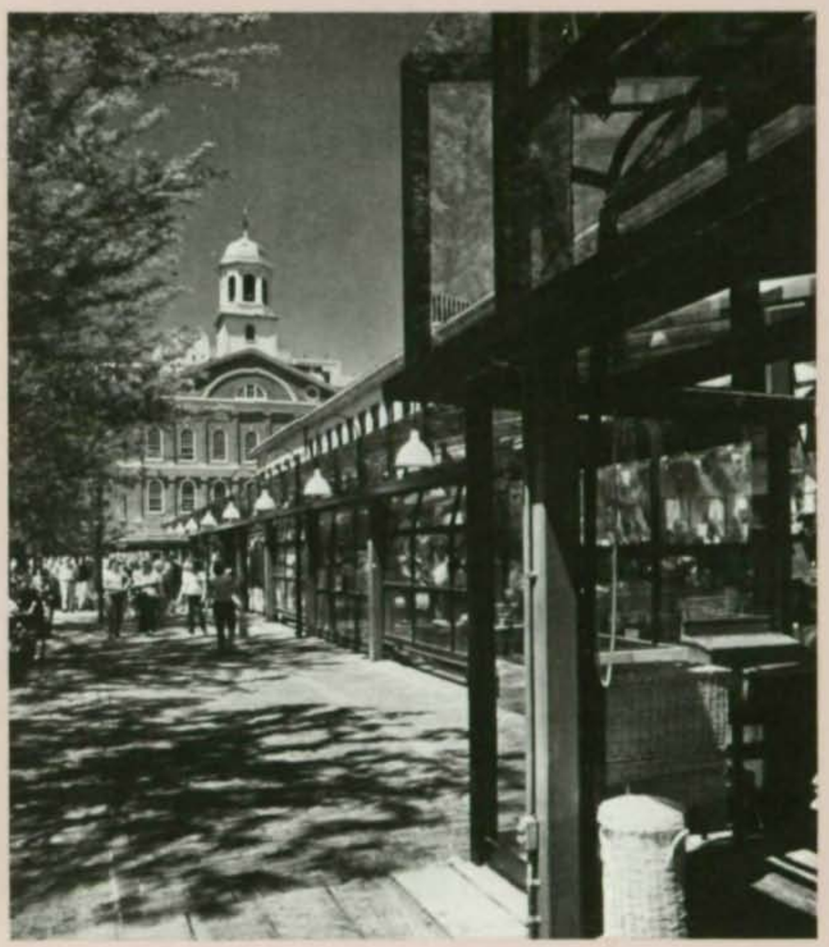
MILFORD JAI ALAI
Milford, Connecticut
Architect: Herbert S. Newman Associates

ANGELA ATHLETIC FACILITY.
SAINT MARY'S COLLEGE
Notre Dame, Indiana
Architect: C. F. Murphy Associates

CITICORP CENTER
New York, New York
Architect: Hugh Stubbins and Associates, Inc.
Associated Architects: Emery Roth & Sons

FANEUIL HALL MARKETPLACE AND FLOWER MARKET
Boston, Massachusetts
Architect: Benjamin Thompson & Associates, Inc.





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THE CAMPUS BELL

The Bell Tower at Bryant College, Smithfield, Rhode Island, is a functional, sculptural element, designed to provide a focal point, central to the campus community. It is located in front of the Student Center at the pedestrian crossroads between the academic/administrative Unistructure and residence halls. Beyond the plaza, a pond reflects the tower's form when approaching the center of the campus from the parking area.

Steel Allows Freedom of Design

The tower consists of twin triangular steel columns 40 ft in height, fabricated of weathering steel. In plan, the towers are 3 ft apart and set opposite hand to each other. A series of 4-in. copper tubes, spaced 7-in. apart, form an enclosure for the speakers between the columns at the top of the tower. These tubes, left untreated, will turn light green through oxidation to contrast in color with the weathering steel. The steel struts, which support the tubes, serve to tie the columns together and provide a platform for access of the electronic systems.

The tower rises out of a base of brick pavers laid in a radial pattern. These pavers match the masonry of the main building of the campus. The paved area drains toward the tower and serves also to control the staining caused by the steel during the early years of weathering. At the periphery of the brick base, curved cast-in-place concrete benches provide outdoor seating and a means of lighting the area at grade level. Two free-standing cubed lights located in the outer planting areas provide effective illumination of the tower during nighttime operations.